

REMARKS

Claims 23-64 are pending in this application. Claims 23 and 24 are independent. Claims 47-64 have been added.

Added claims 47-57 correspond to claims 25 and 27-36, respectively, but dependent on claim 24.

Added claim 58 corresponds to claim 46, but dependent on new claim 50.

Added claims 59-61 correspond to claims 40, 42, and 43, respectively, but dependent on claim 38.

Added claims 62-64 correspond to claims 40, 42, and 43, respectively, but dependent on claim 39.

It is noted that claims 23, 24, and 39 have been amended to replace the phrase "consisting of" with the word "comprising", in order to be consistent with the claim form existing in claims 37 and 38.

Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 26, 27, 28, and 42 contain allowable subject matter.

Drawings

The drawings have been objected to for not showing the feature of claim 42 of a means for variation of the convergence of a bundle of rays. It is noted that the subject matter of claim 42 is disclosed in the specification at page 20, lines 16-23, which states that, "The convergence of the ray bundles directed to the objective 32 and thereby the position of the auxiliary focus 71 relative to the measuring volume 70 can be varied by changing the distances between the free end of the fiber 80 and the achromatic lens 31." In other words, according to the specification, the relative focus position 71 is varied by moving the achromatic lens 31. In order to make this feature explicit, the specification has been amended to state that changing the distances between the free end of the fiber 80 and the achromatic lens 31 is by lens mover portion 85 (i.e., the portion of the lens for carrying out movement). Figure 6 has been revised to show a lens mover portion 85. The revised Fig. 6 is submitted herewith as a drawing replacement sheet. It is respectfully requested that the objection be withdrawn.

Claim Objection

Claim 42 has been objected to due to the phrase "those bundle of rays". Accordingly, claim 42 has been amended. It is respectfully requested that the objection be withdrawn.

Claim Rejection - 35 USC 112

Claims 25-28, and 31 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Accordingly, the claims have been amended to render them definite. It is respectfully requested that the rejection be withdrawn.

Claim Rejection - 35 U.S.C. 103

Claims 23, 25, 29-37, 39-41, 43, 44, and 46 have been rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,181,474 (Ouderkirk et al.) in view of WO 98/44375 (Scherübl et al.) and WO 95/00871 (Picard). Applicant respectfully traverses this rejection.

Priority for the present application has been claimed based on a provisional application filed in the U.S. Patent Office, US 60/113,478, for which an English language translation had also been filed on March 3, 1999 (a copy is attached hereto). US 60/113,478 was filed on December 21, 1998. The Ouderkirk reference has a filing date of March 22, 1999.

Because the date of the priority document 60/113,478 pre-dates the filing date of the Ouderkirk reference, Applicant submits that the rejection should be withdrawn.

Accordingly, Applicant respectfully requests that the rejection be withdrawn.

Claim Rejection – 35 U.S.C. 103

Claims 24, 38, and 45 have been rejected under 35 U.S.C. 103(a) as being unpatentable over WO 98/44375 (Scherübl et al., “Scherübl”) in view of WO 95/00871 (Picard). Applicant respectfully traverses this rejection.

Summary of the Present Claimed Subject Matter

The present invention, in a preferred embodiment, is directed to a method of using a confocal microscope, for example, for reliable identification of an entity arranged on a sheet-support. The present confocal microscope (e.g., Fig. 2) includes a conventional confocal radiation and detection unit comprising, among other things, a radiation source (10) and detector (20). Radiation from the radiation source is collimated by an optic (33) and focused by an objective (32) on a substrate (60) to be examined. A separate radiation source (11) is used for generation of an auxiliary focus (71). Light from the separate radiation source is converged by an optic (31). The auxiliary focus is made on the interface (62) between the substrate (60) and the support (61). The reflected radiation at the interface (62) is focused on the confocal arranged diaphragm (51) by means of the objective (32) and optic (31) and detected by detector (21). Preferably, the auxiliary focus is

positioned on the interface and the measuring volume is generated in a desired distance from the auxiliary focus within the substrate.

A purpose of the auxiliary focus is to determine the position of the interface and, in particular, to enable the detection of the distance between the interface and the optic generating the auxiliary focus. The auxiliary focus and measuring volume have a defined position to each other that is adjustable by the user. Thus, it is possible to track the position of the measuring volume relative to the interface by tracking the position of the auxiliary focus. Then, the measuring volume may be guided in a defined plane with selectable distance from the interface. (Paragraph bridging pages 3-4).


The invention of claim 24 sets the relative positions of the measuring volume and the auxiliary focus. The claimed invention comprises, among other things, a separate collimation of the radiation generated by a first radiation source and of the radiation generated by a second radiation source. Light rays are guided separately and collimated by separate optical elements. By setting the relative positions of the measuring volume and auxiliary focus, the present invention is capable of quantitatively determining the spectral composition of light emitted from an entity.

The present invention is particularly suited for confocal detection of a wide palette of optical parameters, e.g., spectral information such as fluorescence intensity, fluorescence lifespan, Raman scattering.

Scherübl

Scherübl discloses an autofocus method for a confocal microscope. The autofocus method can also be adopted for detecting deviations between a first vertical profile and a second vertical profile, preferably to detect defects in semiconductor structures. The confocal microscope includes a means to produce a first wavelength selective division of the illuminating light and means to produce a second wavelength selective division of light detected from an object.

The confocal microscope operates by optically coding vertical height information of an object as a color representation. Using selective division of wavelength, illumination light of different wavelengths is focused in different object planes. Light of different wavelengths is emitted by the object and captured by different detector elements. The confocal microscope thus obtains a vertical histogram, i.e., vertical distribution over a specific object area. Height information is thereby transformed into a spectral intensity distribution.



Differences over Scherübl and Picard

The present invention, unlike Scherübl, ensures that the confocal measuring volume is maintained in a desired plane/position within the object. In the present invention, the relative positions of the measuring and the auxiliary focus are set independently of wavelength. Thus, the present invention is capable of quantitatively determining the spectral composition of light emitted by the object. By quantitatively determining the spectral composition of light emitted, the present invention can identify entities such as molecules, polymers, cells, bacteria, viruses, etc.

Thus, while Scherübl teaches a confocal microscope capable of detecting defects in semiconductor devices, the present invention can identify the type of entity. Accordingly, the present claimed invention is directed to a “method for optically detecting at least one entity chosen from the group consisting of molecules, molecule complexes, polymers, polymeric particles, particles built up from inorganic materials, vesicular structures, cells, bacteria and virus.” Scherübl, on the other hand, is directed to detecting deviations between a first vertical profile and a second vertical profile. Accordingly, Applicant submits that the present method of detecting an entity and Scherübl’s method of detecting defects are completely different.

Furthermore, the method of claim 24 comprises, among other things, scanning an entity with a measuring volume using a device comprising a first radiation source, generating an auxiliary focus by a second radiation source, detecting a retroreflection from the auxiliary focus, and using the retroreflection for measuring the position of the interface and the position of the measuring volume. In contrast, Scherübl discloses a confocal microscope having an illumination light of different wavelengths focused in different planes of the object and a light of different wavelengths emitted by the object. In Scherübl, height information of the object is transformed into a spectral intensity distribution. Thus, Applicant submits that Scherübl does not teach claimed all elements of claim 24.

Picard is also directed to an assembly that includes a spectrum light source and focusing mechanism for focusing point sources on an object in order to obtain three-dimensional imaging. Thus, Picard also is not directed to maintaining a confocal measuring volume in a desired plane within an object. Applicant submits that Picard does not make up for the deficiency in Scherübl.

Accordingly, Applicant respectfully requests that the rejection be withdrawn.

CONCLUSION

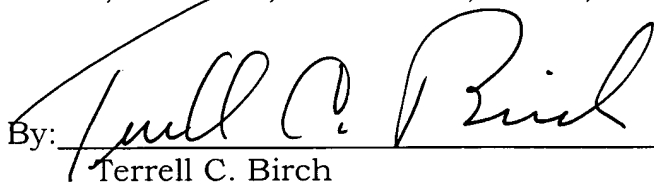
All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and such allowance is respectfully solicited. Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222), to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant respectfully petitions for a three (3) month extension of time for filing a reply in connection with the present application, and the required fee of \$980.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment(s): Figure 6 Replacement Sheet
English language translation of
Provisional Appl. 60/113,478

DRAWINGS

Attached hereto is one (1) sheet of a corrected formal drawing that complies with the provisions of 37 C.F.R. § 1.84. The corrected formal drawing incorporates the following drawing changes:

The drawings have been corrected to add a lens mover portion 85 to Fig. 6.

It is respectfully requested that the corrected formal drawing be approved and made a part of the record of the above-identified application.